Executive Summary

Biomedical research facilities are a critical component of the nation's science and engineering (S&E) research system. The availability and condition of biomedical research space directly affect the scope and quality of the biomedical research conducted at the nation's colleges, universities, medical schools, hospitals, and other research organizations. Numerous Congressional committees have expressed concerns about the quality of S&E facilities and the costs of maintaining them. Hearings held in both House and Senate committees on science and technology in the mid-1980s led to the conclusion that the condition of research facilities posed a "serious and ongoing problem. . . ."

To address the need for information on the amount and quality of research space, Congress mandated that the National Science Foundation (NSF) gather this information and report it to Congress. Since 1986, NSF and the National Institutes of Health (NIH) have collected data on a biennial basis to address Congressional concerns. The first study, a "quick response" survey, provided limited data regarding biomedical facilities issues. In 1988, 1990, 1992, 1994, and 1996, full scale surveys provided considerable information about the nation's academic research facilities.

This report describes the findings from the 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities (Facilities survey) and places them in historical context by comparing results with those from earlier surveys. Following a brief discussion of the study methods, the remainder of this executive summary presents the findings from the 1996 Facilities survey about the availability and condition of this nation's biomedical research facilities.

Methods

The college/university sample for the 1996 Facilities survey represents a universe of approximately 560 institutions. This universe includes all colleges and universities with research and development expenditures of $50,000 or more as well as Historically Black Colleges and Universities with any R&D expenditures.[1] In addition, a sample of hospitals, medical schools and nonprofit research organizations that received extramural research funding for biomedical research from NIH in fiscal year 1992 were also included in the study.

[1] The first two cycles of the survey, 1986 and 1988, included only 29 HBCUs. Based on additional information not available when the first two surveys were conducted, the sample for the 1992 and 1994 studies were expanded to represent an enlarged group of 70 research-performing HBCUs.

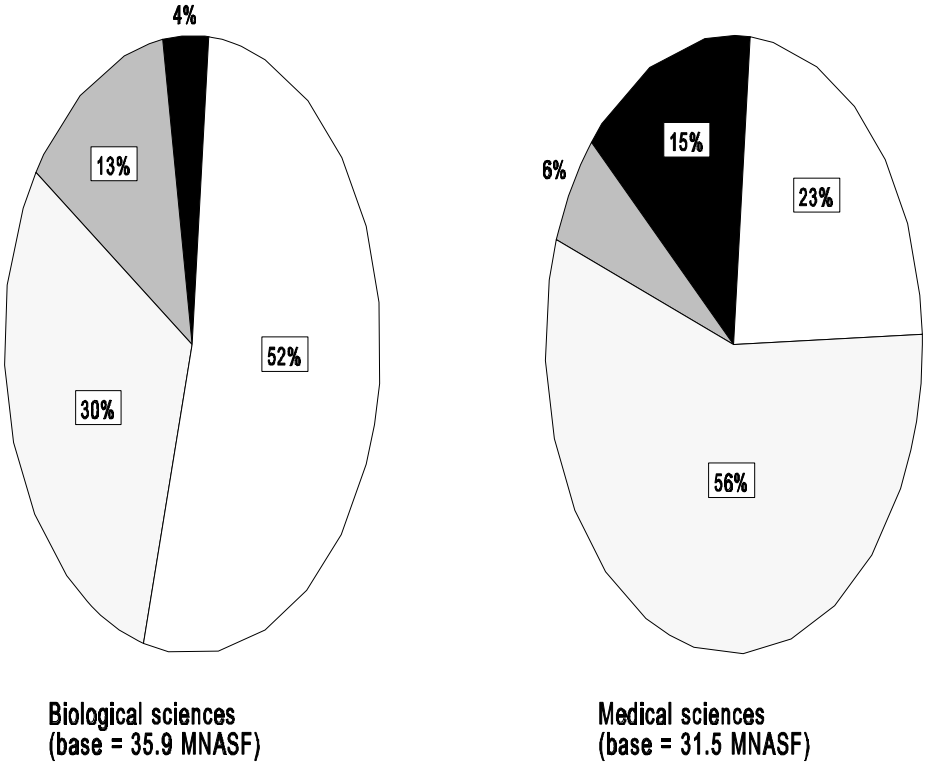
The 1996 survey was mailed to all sampled institutions in the fall of 1995. Extensive telephone follow-up was used to elicit a 93 percent response rate and to resolve questions regarding incomplete or inconsistent responses. Sampled institutions that participated in the 1994 survey were also sent a computer generated "facsimile" of their previous responses. (See Appendix A, Technical Notes, for a detailed description of the sampling procedures and data collection methods.)

Amount of Research Facilities Space

In 1996, institutions performing biomedical research devoted about 67.4 million net assignable square feet (NASF) to this research.[2] This figure represents continuing growth in the amount of biomedical space — from 51.9 million NASF in 1988 to 62.5 million NASF in 1994 to 67.4 million in 1996. Of the 67.4 million NASF, 35.9 million NASF was devoted to research in the biological sciences, and 31.5 million NASF was devoted to research in the medical sciences. Forty-two percent of all biomedical research space was located in medical schools, while 39 percent was located in colleges and universities. Of the biomedical research space, 56 percent of medical science research space was located at medical schools (Chart ES-1). Fifty-two percent of biological science research space was located at colleges and universities.

Chart ES-1
Distribution of biomedical research space in biological and medical sciences, by type of institution: 1996

[2] Throughout this report, research is defined as "all research and development activities of an institution that are budgeted and accounted for." Research can be funded by the Federal government, state governments, foundations, corporations, universities, or other sources. "Research space" refers to the net assignable square footage of space within research facilities (buildings) in which research activities take place. Multipurpose space, such as an office, is prorated to reflect the proportion of use devoted to research activity.

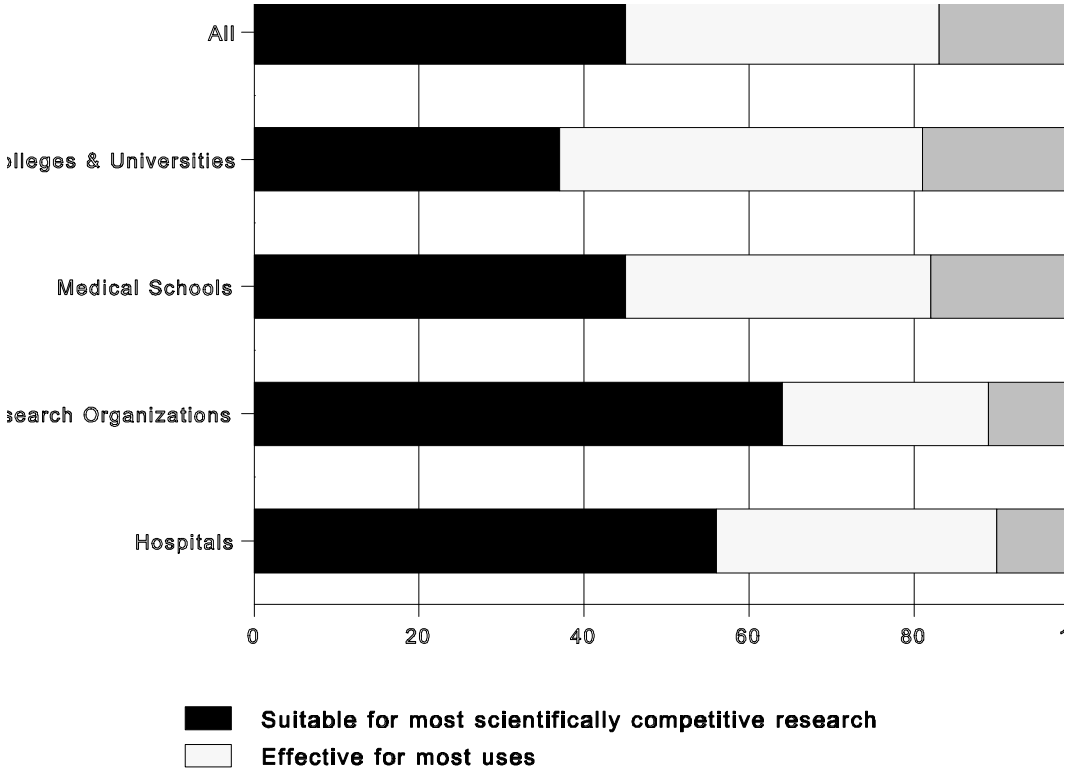


Adequacy and Condition of Research Facilities Space

A large proportion of survey respondents indicated that the biomedical research space available to them in 1996 was inadequate and not sufficient to support the needs of their research. In fact, over half of the institutions, 51 percent, classified their medical science research space and 47 percent classified their biological science research space as inadequate.

Of the 67.4 million NASF of biomedical research space available in 1996, 11.5 million NASF (17 percent) needed either major repair or renovation or needed replacement (Chart ES-2). Approximately 45 percent of all biomedical research space was rated as suitable for use in the most scientifically competitive research. This proportion decreased for colleges and universities; which rated 37 percent of their biomedical space as suitable for competitive research.

Chart ES-2
Condition of biomedical research facilities, by institution type: 1996



NOTE: Because of rounding, components may not add to 100.

SOURCE: National Institutes of Health, *The Status of Biomedical Research Facilities: 1994*, Bethesda, MD, 1996

Construction and Repair of Research Facilities

In fiscal years 1994-1995, institutions spent $1,521 million to construct new biomedical research space. This amount represented a decline of $723 million in constant dollars from the two previous fiscal years and the first decline in construction expenditures since NSF and NIH began collecting data on biomedical research facilities.

During the same time period, institutions spent $674 million to repair/renovate biomedical research space. This amount also represented a decline in expenditures from the previous two fiscal years and only a slight increase, in constant dollars, since 1986-1987.

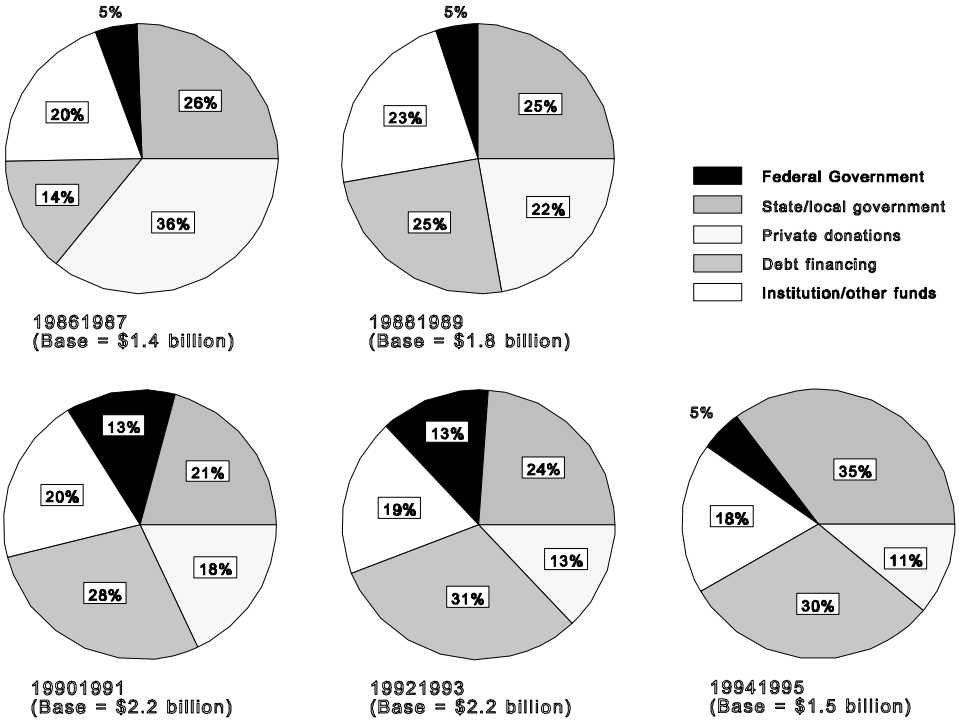
Funding of Research Facilities Projects

Of the $1,521 million spent on new construction of biomedical research facilities in fiscal years 1994-1995, state and local governments provided 35 percent of the funds and institutions funded 30 percent with debt financing (Chart ES-3). This represented the largest percentage contribution from state and local governments of any survey year. In fiscal years 1986-1987, private donations represented the primary source of

construction funding — 36 percent. Over time, funding from the Federal government increased from 5 percent to 13 percent between the 1986-1987 and 1992-1993 fiscal years and declined once again to 5 percent in 1994-1995.

Institutional funds represented the largest contribution to the repair/renovation of biomedical research space in 1994-1995, 46 percent. Eight percent of all repair/renovation funding of biomedical research space was provided by the Federal government in that same year.

Chart ES-3
Sources of funds for construction of biomedical research facilities: 1986-1995[1]



[1]Findings are limited to projects with estimated total cost at completion of $100,000 or more for research space. Estimates are prorated to reflect research components only. Current dollars have been adjusted to 1993 constant dollars using the Bureau of the Census' Composite Fixed-Weighted Price for Construction.

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Deferred Construction and Repair/Renovation

Since its inception in 1988, the *Survey of Scientific and Engineering Research Facilities at Colleges and Universities* has provided considerable data on the amount, condition, and capital project activity in our nation's research-performing institutions. An equally important issue, and a concern to policy makers, is the amount of additional S&E research space needed as well as the cost to repair/renovate existing S&E research facilities.

The 1996 survey asked respondents to report deferred construction and repair/renovation costs that related to current S&E research program commitments. Several other limits were placed on respondents to avoid "wish list" types of estimates (See Item 7 of the survey in Appendix B). IN 1996, 36 percent of all institutions with biomedical research space reported construction or repair/renovation projects that were needed but had to be deferred because funds were not available. The total estimated cost for deferred biomedical research construction and repair/renovation projects in 1996 was $4.1 million.

Research Facilities Space at Historically Black Colleges and Universities

Historically Black Colleges and Universities (HBCUs) have played an important role in the education of black students at all higher education levels for over 100 years. These universities and colleges consist of both public and private institutions as well as two-year, four-year, and professional schools. In 1991, approximately 269,000 students attended the 105 institutions of higher education considered HBCUs by the U.S. Department of Education. Although the HBCUs have considerably less biomedical research space than other research-performing institutions, the HBCUs are an important source of science degrees for the black students who are currently enrolled in college.[3]

In 1996, 68 research-performing HBCUs contained 2.4 million NASF of S&E research space. Of this space, 29 percent (700,000 NASF) was devoted to biomedical research. Compared to all research-performing academic institutions, HBCUs comprised 12 percent of the nation's research-performing institutions, but only contained 1.8 percent of the nation's 54.6 million NASF of biomedical research space.

HBCUs reported that eight percent of their biomedical research space needed major repair/renovation to be used effectively. Among a panel of 29 institutions that has been sampled consistently since 1988, funding for

[3] A recent study of science and engineering doctorates revealed that almost 30 percent of black science and engineering doctorate degree recipients between 1985 and 1990 received their degrees from HBCUs.

repairs/renovation increased from $2 million in fiscal years 1992-1993 to $6.8 million in the next two fiscal years. In both time periods, only two HBCUs reported repair/renovation projects of $100,000 or more. Since the first NSF/NIH survey, new construction funding declined steadily, from $42 million in 1986-1987 to $0.2 million in 1994-1995. HBCUs received 70 percent of the funding for new construction of biomedical research space from the Federal government.

Laboratory Animal Research Facilities

In 1996, 85 percent of biomedical research-performing institutions maintained laboratory animal facilities. In total, 659 institutions contained 14,030,000 NASF of animal research space. Eighty-two percent of this space fully met government regulations on the humane care of laboratory animals. Nine percent of the space required limited repair/renovation before being able to meet compliance standards, while 8 percent required major repair/renovation. Eighteen percent of the institutions with animal care research space scheduled a total of $265.7 million of either repair/renovation or new construction projects for laboratory animal facilities for fiscal years 1996 and 1997.

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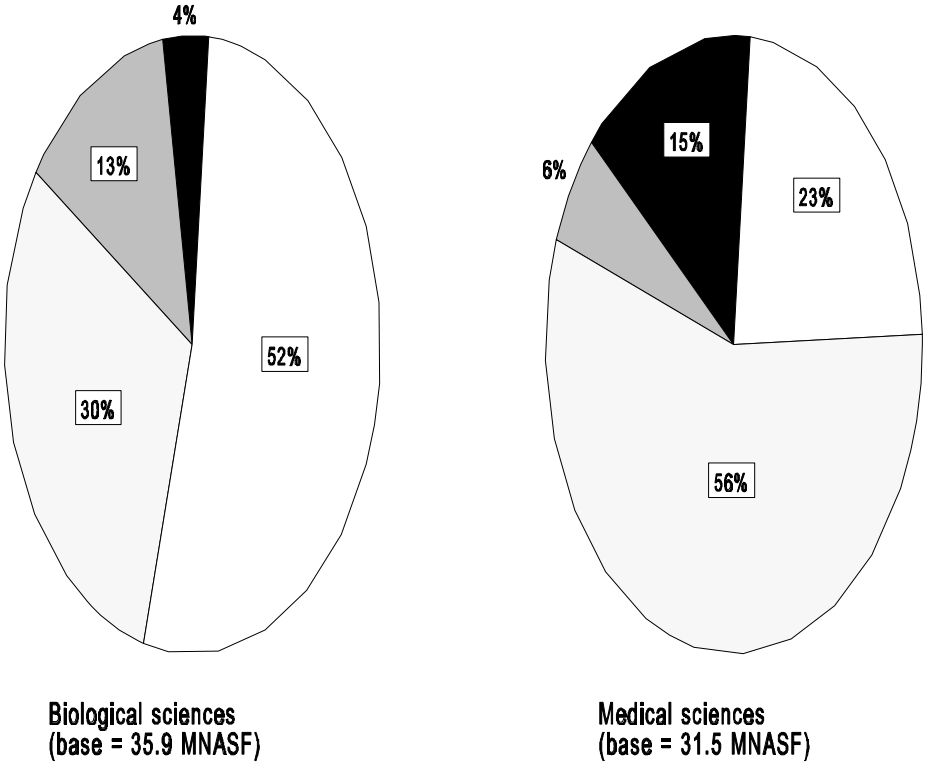

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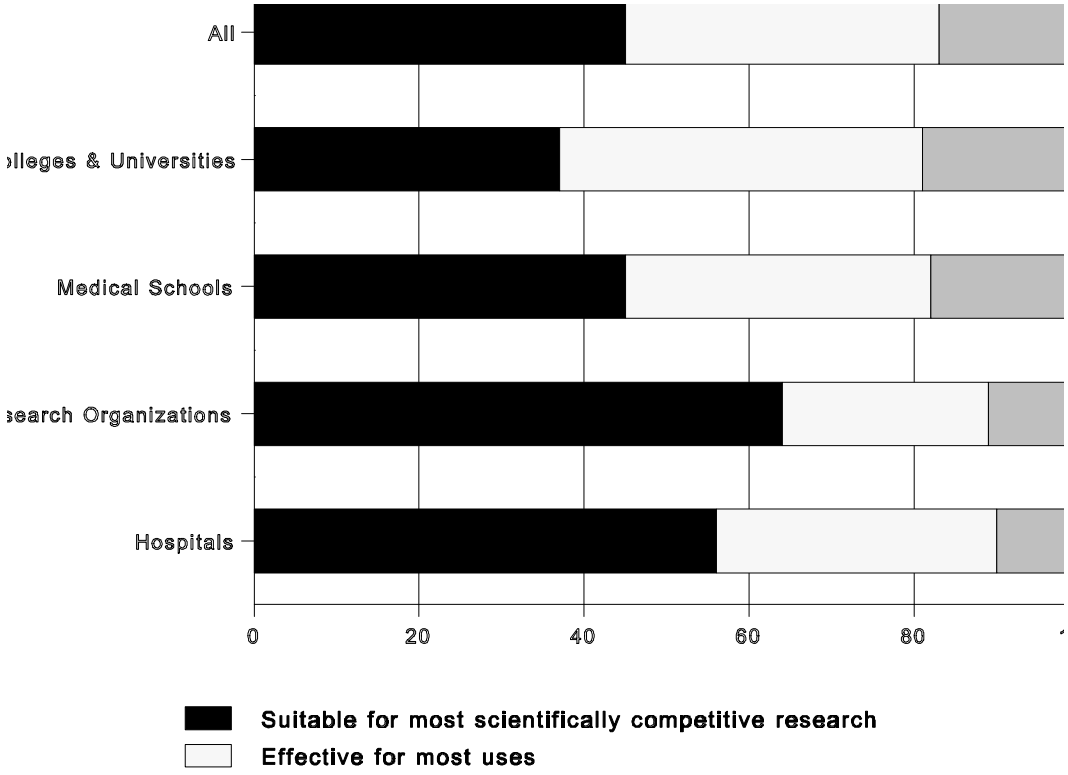

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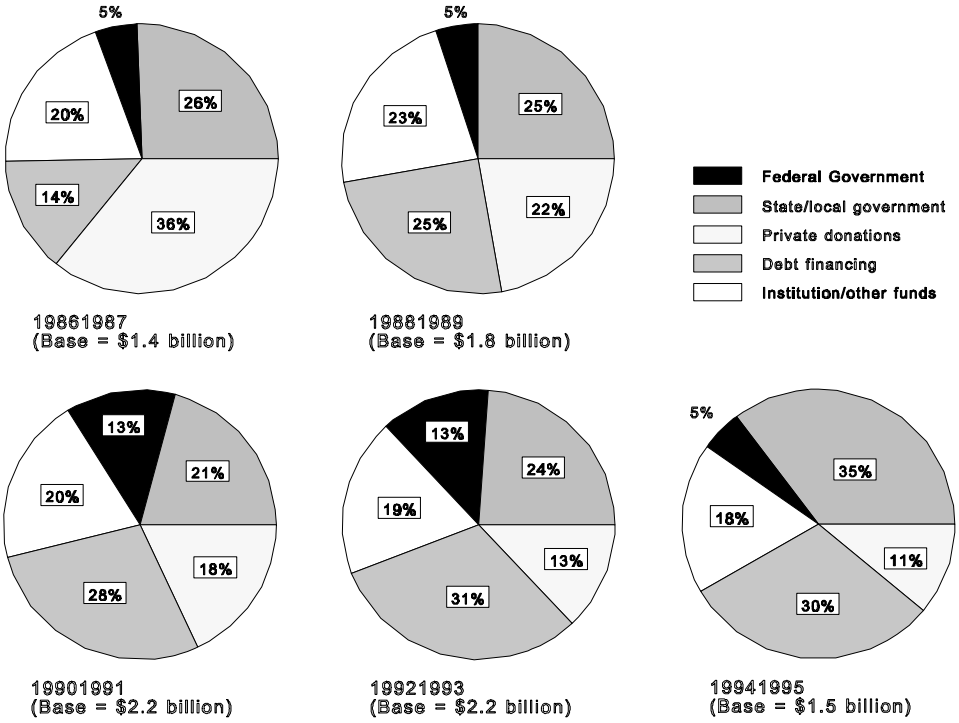

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